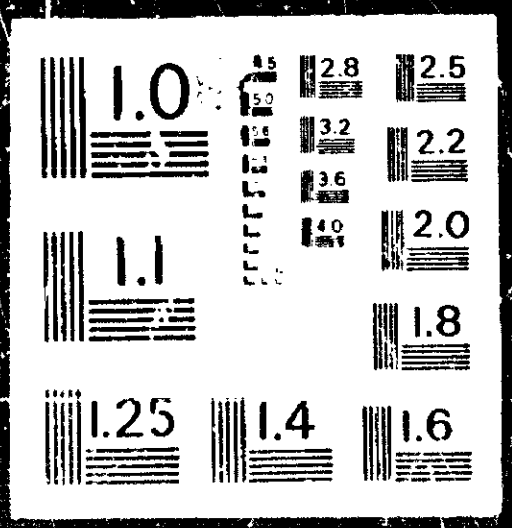

U.S. DEPARTMENT OF COMMERCE
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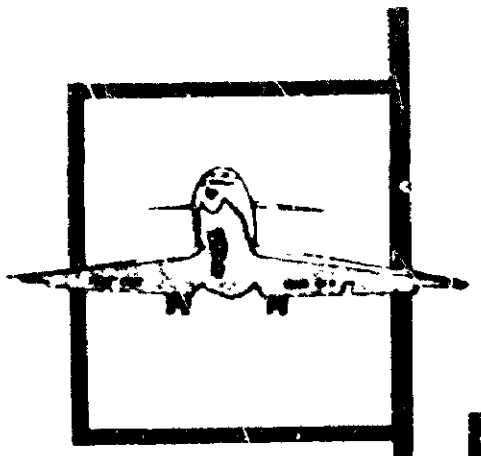
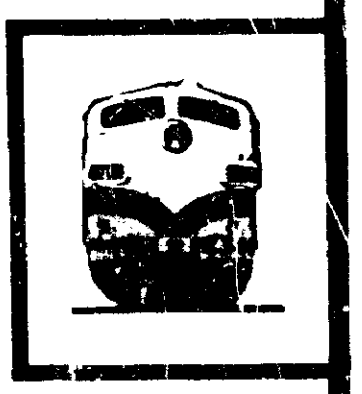
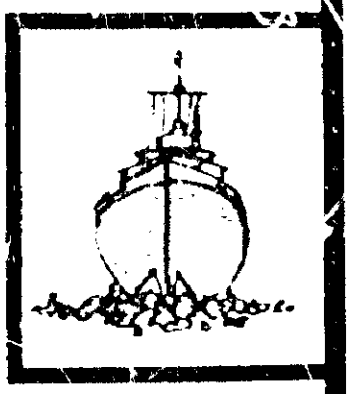
Special Investigation Report Results of a Survey on Occupational Training in the Railroad Industry

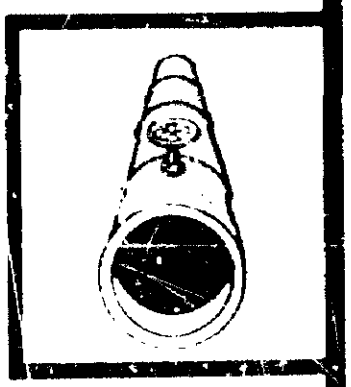
(U.S.) National Transportation Safety Board, Washington, DC

5 Sep 79









NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

SPECIAL INVESTIGATION REPORT

RESULTS OF A SURVEY ON OCCUPATIONAL TRAINING IN THE RAILROAD INDUSTRY

NTSB-SIR-79-1

UNITED STATES GOVERNMENT

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16. Abstract

This report is a brief factual description of the training the majority of the Class I Railroads provide employees working in operations, maintenance, and inspections. The report is based on information provided to the Safety Board by 28 of the Class I Railroads, the railroad unions, the Federal Railroad Administration, the Department of Labor, and the Interstate Commerce Commission in response to questions on the subject of training.

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CONTENTS

INTRODUCTION

Since 1968, the National Transportation Safety Board has issued 19 recommendations to the Federal Railroad Administration (FRA) and the railroad industry directed toward correcting training deficiencies. In a 1971 Special Study "Signals and Operating Rules as a Causal Factor in Train Accidents," the Board recommended that the FRA —

> "Establish a program to review current training procedures for employees on the railroad and on the basis of the results and in cooperation with the railroads and the AAR expand and develop a comprehensive training program applicable to the various crafts, trades and personnel employed in the several operational modes. The training program should be subject to periodic review by FRA and should assure by examination that those who complete the training are qualified to perform their duties with safety."

The railroads involved in accidents investigated by the Board generally took steps to correct specific deficiencies in their training programs on a case by case basis in response to Safety Board recommendations. The Railroad Safety Act of 1970 gave the FRA the power "to prescribe rules, regulations, orders, and standards and to conduct research, development, testing, evaluation, and training for all areas of railroad safety." FRA has done some work in the field of rules instruction and intends to evaluate rules training.

Since accidents involving training as an issue continue, the Safety Board decided to take a closer look at railroad training to develop an understanding of railroad training programs which could be documented for subsequent use as a training data base in future accident investigations where training, or the lack thereof is an issue. A two-part inquiry form was developed and sent to 42 Class I railroads, reporting more than $50 million in operating revenue, to find out how they trained personnel responsible for the safe movement of trains.

The questions in Part I of the form were concerned with the management aspects of training in the railroad industry. (See Appendix A.) The series of questions was included because training programs are more successful when they have the full support of top management.

Twenty-eight railroads responded in sufficient time to be included in the study. The responding railroads represented more than 85 percent of the Class I railroad employees in maintenance, inspection, and operation.

Labor organizations also were invited to tell the Board how they participated in the occupational training of their members. (See Appendix B). Additionally, inquiries were addressed to the FRA, the Interstate Commerce Commission, and the U.S. Department of Labor.

RESPONSES TO INQUIRY

Railroad

Slightly more than half of the responding railroads have a formal policy statement regarding training. Eleven of these railroads used the word "safe" or "safety" as an objective of the policy. Seventeen railroads had training officials reporting to the corporate level; all but three of these had a formal policy. Thus for those railroads reporting a policy the commitment was backed up with a strong training organizational structure. (Figure 1 is a chart of the prominent managerial elements that characterize training in the railroad industry.)

Sixteen railroads said they had permanent staffs in their training departments. Staff size ranged from 1 to 81; the median number was 5. Eleven of these were counted among those reported as having a policy statement. The ratio of permanent training staff to employee population ranged from 1 to 160 to 1 for 11,000 employees. The median was 1 to 500.

All reported the use of selected employees as instructors for most training assignments. Responses associated with the qualifications of the instructional staff indicated that the primary consideration in selecting instructors was job knowledge and experience followed by ability to communicate and deal with people.

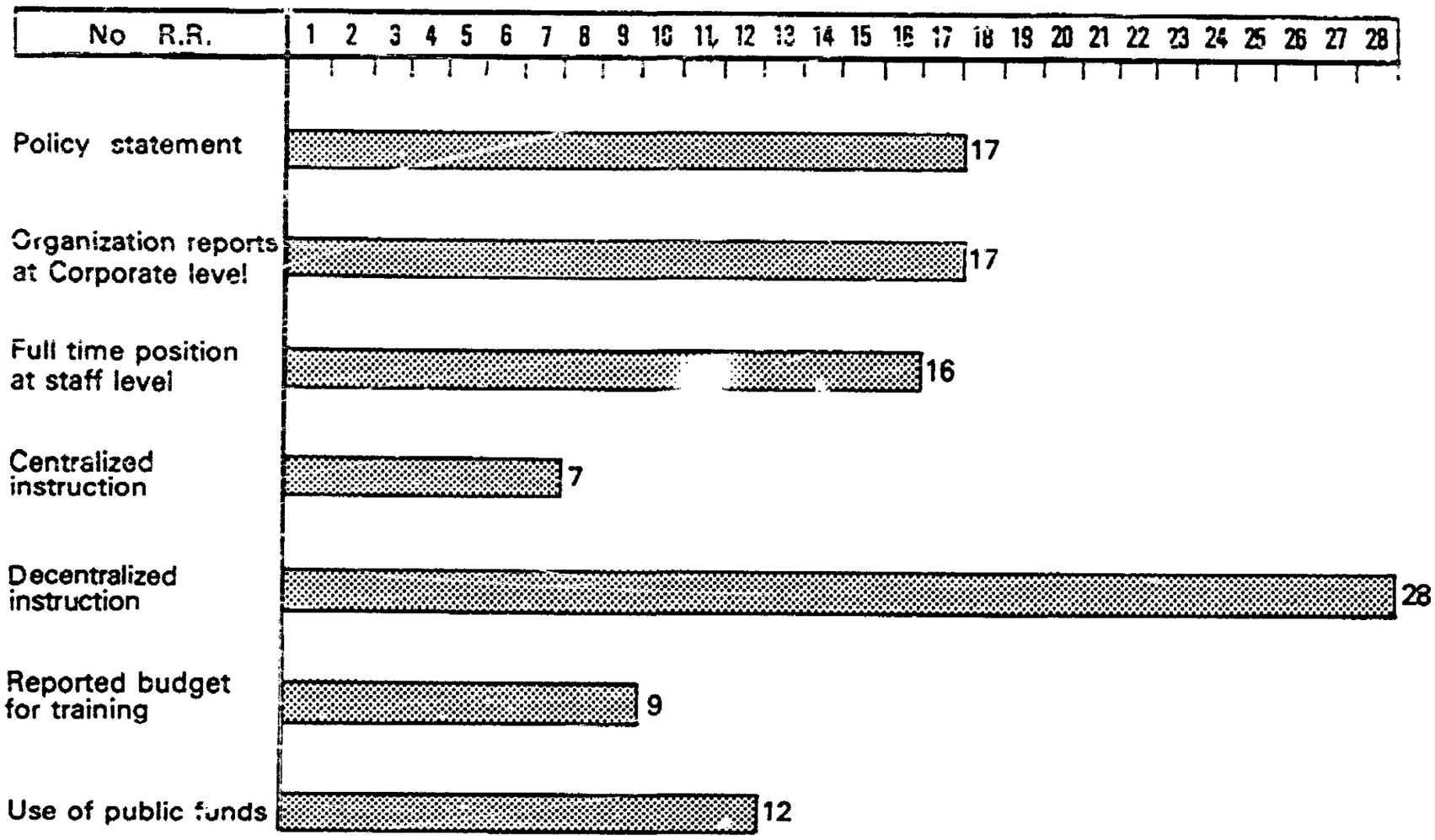
Training in the railroad industry takes many forms. Although some railroads had centralized training for some jobs, most training was conducted in many locations because of the large territory serviced by the industry. Depending on the subject, training may be conducted in the railroads' classrooms, at a supplier's school, at a private technical school, by correspondence, on the job, or through an apprenticeship. A quotation from one of the railroads is illustrative of the industry approach to training: "In addition to formal training programs, there is heavy involvement on a daily basis by supervisory personnel in operations in on-the-job checks on safety practices. Meetings and rules classes on safety are a continuing 'way of life.' Supervisory officers regularly ride trains to insure compliance with rules. In the Maintenance of Way and Mechanical departments, there are specific supervisory officers who hold meetings and classes on safety. This is in addition to local training in safety conducted by line officers."

Nine of the 28 reporting railroads budgeted funds separately for training in 1977, although 14 projected separate budgets for 1978. The rest had their costs embedded in other organizational accounts. In at least three cases a percentage of supervisory time was part of the estimate. Some railroads responded that identification of training costs was the most difficult question asked by the Board. No common method of accounting for training costs exists in the industry.

The absence of a dedicated budget undoubtedly has a marked influence on the extent and level of training undertaken from year to year. For example, managers will almost certainly subordinate training to the competing goals of maximizing the primary function of their departments. The mean number of training hours in 1977 for those railroads reporting a dedicated budget was 41 hours per trainee; it was 11 hours for those without a dedicated budget.

Figure 1.

MANAGERIAL CHARACTERISTICS OF RAILROAD TRAINING



Although each of the Class I railroads had an operating budget of at least $50 million, the size of the railroads differed greatly. The responses were examined to determine if size (number of employees) affected the training effort. A comparison was possible for a sample of 7 railroads with fewer than 5,000 employees and 9 railroads with 10,000 to 20,000 employees. 1/ The smaller companies trained, on the average, 10 percent of their employees during 1977. Railroads employing 10,000 to 20,000 persons trained 20 percent of their employees.

Twelve railroads reported the use of public funds in support of their training programs. The funds were made available through the Comprehensive Employment and Training Act (CETA) and Help Through Retraining and Employment (HIRE). These funds are available through the Department of Labor to help individuals qualify themselves for employment; however, some require local community participation. These programs, therefore, are only indirectly associated with supporting the training needs of the railroad industry. Since railroads frequently cross many State lines, it is difficult for the industry to generate much State or local support when that is a requirement. Before 1978 many railroads were not aware of CETA and HIRE funds, a situation since corrected by the FRA.

The remaining 25 questions in Part II of the inquiry were directed at soliciting information on training of railroad employees in ICC Classification III through VIb. (See Appendix A - Part II.) They focused attention on the content, design and management of current training programs. The series of questions was included because the specification of required knowledge and skills through a training-requirements analysis is generally considered basic to the determination of training objectives and the construction of a training program. The qualification of the instructional staff, the training facilities, a mechanism for measuring learning achievement, and overall assessment of the training program are indications of thoroughness and professional application of the planned training program.

Responses by the railroads to each of the 25 questions resulted in a large amount of data. The primary purpose in gathering this information was to learn what specific training methods are employed by the railroad industry. The data were, therefore, consolidated to show, on an industry-wide basis what training was accomplished and how it was accomplished. Figure 2 combines the division's (crafts) for which training was provided. These submissions were evaluated and each division for which training was reported was assessed. A railroad providing evidence of a structured program, aids, facilities and a significant investment in time was coded in Figure 2 in the darkest shade; the intermediate shade indicates that training was accomplished through some structured training, but greater dependence was placed on on-the-job training; the diagonal lines indicate training which depends exclusively on on-the-job training, and the white or blank code indicates that no training was reported. The numbers represent the number of employees in each division as reported to the ICC. Based on the data submitted by 19 of the responding railroads, the percentage of employees trained in 1977 ranged from 9 percent to 89 percent.

1/ There were too few railroads referenced at classification intervals above 20,000 employees to allow a comparison.

A number of facts are immediately evident from a review of this chart. First, the railroads do a lot of training. Second, all do not agree on who will be trained and how the training will be accomplished. Third, many employees receive no training. (It should be noted, however, that many of the squares on Figure 2 are blank because there are no persons employed in these categories or the number of such employees is small.) There are exceptions, and in such cases in spite of large numbers of employees, the railroad reported no formal effort to train these employees. Many of these skills may be available in the employment market or the railroad may believe the skills can be readily learned on the job and an acceptable level of productivity and safety can be achieved through proper supervision.

Training in Class III Maintenance of Way and Structures.-- Training in terms of amount (hours) and type (apprentice, classroom, on-the-job) varied for the different divisions in each of the six classes examined. Of the Maintenance of Way and Structures employees trained (Class III), most training was given to road-masters, bridge and building gang foremen, signalmen, signal maintainers, assistant signalmen and assistants, maintainers, and maintainer helpers. The ICC reports there are 92,000 employees in this class. Maintenance of way employees who received training generally received initial orientation training ranging from 2 to 8 hours. This was followed by a period of qualifying training. For some skills the apprenticeship ranged from 2 to 3 years.

Twenty railroads reported classroom training ranging from 8 hours to as much as 320 hours. Signalmen, track foremen, and supervisors were the primary recipients of this training. Most railroads indicated that on-the-job training was an important part of their programs. Four railroads reported that training for divisions 44 through 49 was conducted in a central facility or training center, which included dedicated classrooms, simulators, tracks, shops, and other equipment. Qualification for assignment to duty depended on the job involved. When classroom work was involved, it included a written examination. Completion of training and instructor/supervisor endorsement were the most often cited means of qualification. Proficiency was maintained through rules review, periodic classroom training, supervisory guidance, and distribution of relevant bulletins. Most employees in this class were trained annually.

Fourteen railroads reported that employees in some Class III crafts were issued certificates of proficiency. In most instances, companies that issued certificates of proficiency required the certificates for assignment to duty.

Employee training records were maintained for some employees in this class. Eleven railroads used these records to evaluate training effectiveness. Management judgment of effectiveness, improved test scores, and injury experience were the primary evaluation criteria.

Training in Class IV— Maintenance of Equipment and Stores. -- Class IV includes the shop craft employees. The ICC reports that there were over 112,000 employees in this class in 1977. Figure 2 shows training was not provided for a large number of crafts, but where training of these employees is performed, it is

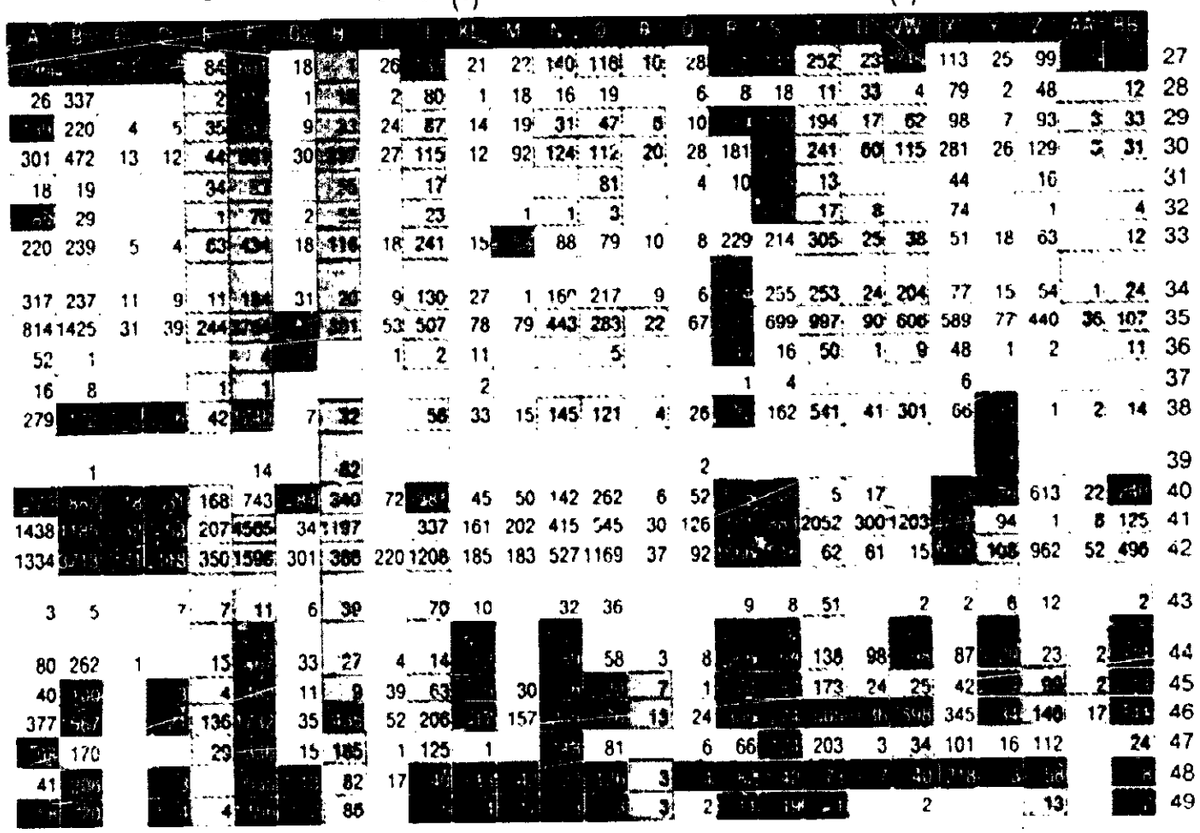
FIGURE 2

Occupational Training in the Railroad Industry 1977

(28) Reporting Railroads *No Craft Breakdown or Incomplete Part 2 (*) Two Railroads

Employee Classification

III. Maintenance of Way and Structures



27 Roadmasters, general foremen, and assistants
28 Maintenance of way and scale inspectors
29 Bridge and building gang foremen (skilled labor)
30 Bridge and building carpenters
31 Bridge and building ironworkers
32 Bridge and building painters
33 Masons, bricklayers, plasterers, and plumbers
34 Maintenance of way and structures helpers and apprentices
35 Portable equipment operators
36 Portable equipment operator helpers
37 Pumping equipment operators
38 Gang foremen (extra gang and work-train laborers)
39 Gang foremen (bridge, building, signal and telegraph laborers)
40 Gang or section foremen
41 Extra gang men
42 Section men
43 Maintenance of way laborers (other than track and roadway) and gardeners and farmers
44 General and assistant general foreman, and inspectors (signal, telegraph, and electrical transmission)
45 Gang foremen (signal and telegraph skilled trades labor)
46 Signalmen and signal maintainers
47 Linemen and groundmen
48 Assistant signalmen and assistant signal maintainers
49 Signalman and signal maintainer helpers

All figures in blocks equal total railroad employees in classification

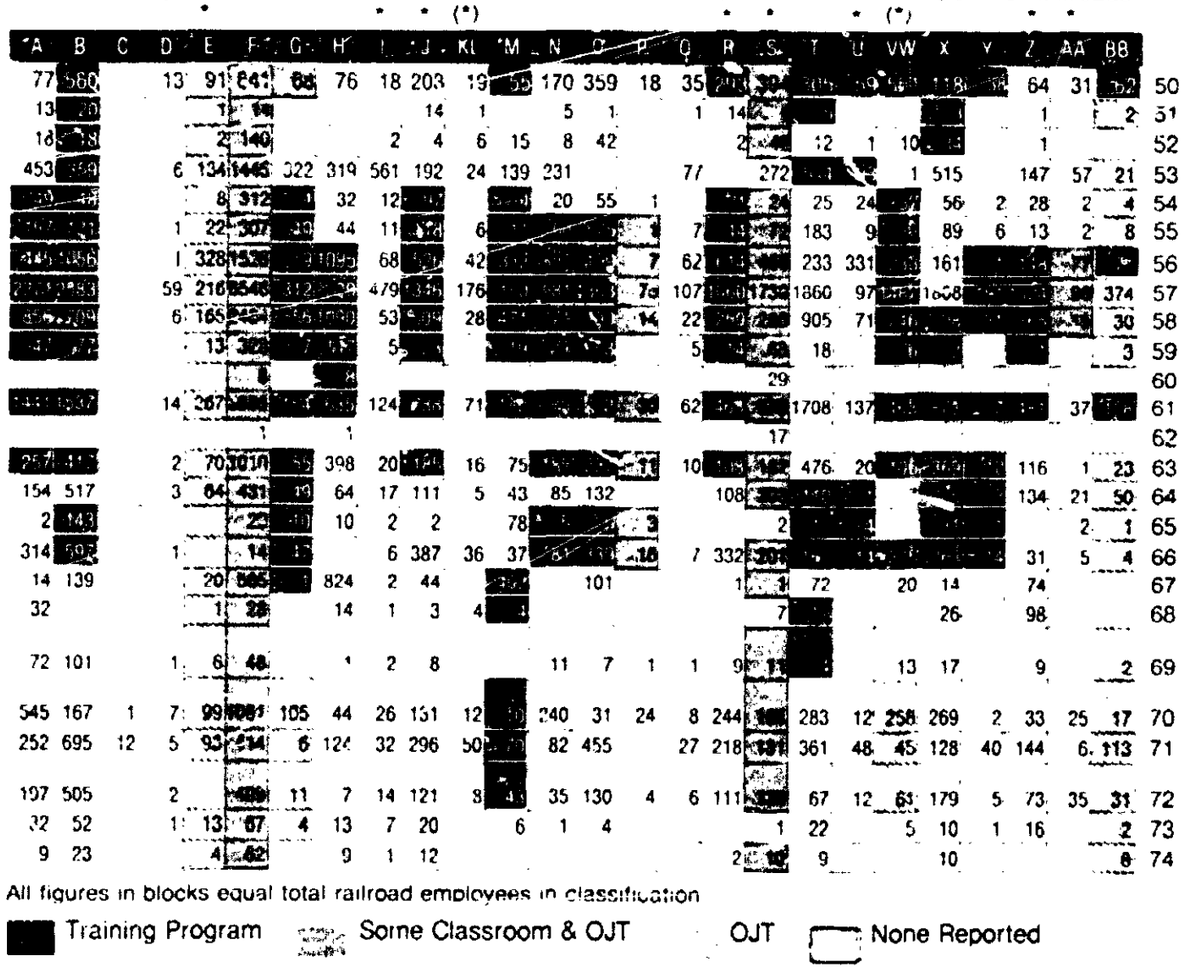
Legend Training Program Some Classroom & OJT OJT None Reported

FIGURE 2

Occupational Training in the Railroad Industry 1977 Continued

Employee Classification

(28) Reporting Railroads *No Craft Breakdown or Incomplete Part 2 (*) Two Railroads



All figures in blocks equal total railroad employees in classification

Legend Training Program Some Classroom & OJT OJT None Reported

FIGURE 2

Occupational Training in the Railroad Industry 1977 Continued

(28) Reporting Railroads *No Craft Breakdown or Incomplete Part 2 (*) Two Railroads

Employee Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	
V. Transportation (other than train, ..., engine, and yard)																													
75 Chief train dispatchers	[redacted]			5	22	[redacted]	13	16	5	28	3	[redacted]	50	[redacted]	[redacted]	4	36	[redacted]			33	70	[redacted]		1	9	75
76 Train dispatchers	[redacted]	227		6	48	[redacted]	14	60	24	76	9	[redacted]	65	[redacted]	[redacted]	[redacted]	75	[redacted]			97	126	[redacted]		5	[redacted]	76
77 Train directors					12	[redacted]		16		5		49	9											1			77
78 Station agents (supervisory—major stations—nontelegraphers)	143	69	16	6	26	[redacted]	8	14	5	51	11	6	69	173	7	7	90	[redacted]	56	12	[redacted]	21	5	37	8	15	78
79 Station agents (smaller stations—nontelegraphers)	19	127		11	9	[redacted]	2	3	10	128	2		55	15		7	70	[redacted]	40	1	[redacted]	98	14	134	4	15	79
80 Station agents (telegraphers and telephoners)	296	534		16	197	[redacted]	33	1	21	45	25	66	[redacted]	147	9	32	165	[redacted]	[redacted]	[redacted]	[redacted]	150	1	135	5	[redacted]	80
81 Chief telegraphers and telephoners or wire chiefs	[redacted]	160			31	44	11			5				10		6	18	[redacted]	[redacted]	[redacted]	3	[redacted]	13	7		6	81
82 Clerk-telegraphers and clerk-telephoners	[redacted]	306		52	96	[redacted]	7		6	185	29	4	81	[redacted]	27	31	187	[redacted]	[redacted]	[redacted]	317	137		192	21	1	82
83 Telegraphers, telephoners, and towermen	94	661			90	[redacted]	[redacted]	[redacted]	43	287	15	[redacted]	106	[redacted]		3	106	[redacted]	[redacted]	[redacted]	60	119	20	152	5	[redacted]	83
84 Station masters and assistants					1	37		25		1		17							3					3			84
85 Supervising baggage agents		1				7		1														1					85
86 Baggage agents and assistants		10				14		1											2					1			86
87 Baggage, parcel room, and station attendants		7			1	172	2	[redacted]		26		56		19			13		1		55	3		9			87
88 General foremen (freight stations, warehouses, grain elevators, and docks)	1	14				5	2		2					6			4	[redacted]	1		4	4		3			88
89 Assistant general foremen (freight stations, warehouses, grain elevators, and docks)		5				1	2										2	[redacted]	1					1			89
90 Gang foremen (freight station, warehouse, grain elevator, and dock labor)	9	57				20	2		2	1				9		4	5	[redacted]	8	1	9	23	1	2		3	90
91 Callers, loaders, scalers, sealers, and perishable-freight inspectors	92	30				108	7			6			9	9		5	70	[redacted]	33	3	5	37		2			91
92 Truckers (stations, warehouses, and platforms)	45	47				14	2	23	2	4	1		24	32	2		1	[redacted]	4			6		32			92
93 Laborers (coal and ore docks and grain elevators)		91				94								33				[redacted]						41		4	93
94 Common laborers (stations, warehouses, platforms, and grain elevators)	8	31		3	3	66		11	7	39			3	109				[redacted]	11		95	1		3			94
95 Stewards, restaurant and lodging-house managers, and dining car supervisors	9	6				5	3	[redacted]				6		2							9	2					95
96 Chefs and cooks (restaurants or dining cars)		9				1	6	[redacted]	2	2			3				1				21	31					96
97 Waiters, camp cooks, kitchen helpers, etc	8	27			9	206	9	[redacted]	6				53	74	4		2	[redacted]			38	137		2	3		97
98 Officers, workers, and attendants on barges, launches, ferry boats, towing vessels, and steamers, and shore workers	26					70			30					2			3	[redacted]					22				98
99 Transportation and dining-service inspectors	58	21		1	18	4	1	4		10			1	1		1	6	[redacted]	5		33	12		7		5	99
100 Parlor and sleeping car conductors																											100
101 Train attendants	15	22			4	5	5	[redacted]		2	1	62	2	15			6	[redacted]	22	1	79	36	1	2	1		101
102 Bridge operators and helpers	6	89			5	86			4	15	10	1	73	64		1	28	[redacted]	53	3	45	23		28		3	102
103 Crossing and bridge flagmen and gatemen	2	48		7		212			51	5		7	33	5			3	[redacted]			1	11		13		5	103
104 Foremen (laundry) and laundry workers																											104

All figures in blocks equal total railroad employees in classification

Legend [redacted] Training Program Some Classroom & OJT OJT None Reported

FIGURE 2

Occupational Training ir the Railroad Industry 1977 Continued

Employee Classification

(28) Reporting Railroads *No Craft Breakdown or Incomplete Part 2 (*) Two Railroads

VI. (a) Transportation (yardmasters, switch tenders, and hostlers)

	Employee Classification	A	B							M	N	O	P	Q	R	S	T	U	VW	X	Y	Z	AA	BB	
105	Yardmasters	292	395	74	19			2	103	196	37	43	158	132	2	24	116	246	313	36	145	226	25	155	23	44	105
106	Assistant yardmasters	21	9	71			58						17		5		18	1		2	5	3					106
107	Switch tenders		32			13	8			19			16	5				74	13			4		19			107
108	Outside hostlers	28	131			23	305	24	3	27	5	28	137	129	5		123	59	105	21	39	151	6	49		5	108
109	Inside hostlers	106	58			17	226	5	8	32	3		11	22	9	11	27	107	39	6				32	9	14	109
110	Outside hostler helpers	13	109			3	16	22	1	18	6		4	119	10		107	5	18	18	32	32	13	6			110

VI. (b) Transportation (train and engine)

	Employee Classification																									
111	Road passenger conductors	81	44			28	882	5	5	98		10	63	1		15	8	80		18	13	60			111
112	Assistant road passenger conductors and ticket collectors	1				11	1304			58												96			112
113	Road freight conductors (through freight)	1137	17			200	1761	105	72	345	79	429	342	28	76	382	479	807	141	384	709	88	283	11	77	113
114	Road freight conductors (local and way freight)	282	164			148	937	6	14	196	69	386	485	31	19	403	371	474	31	494	308	18	203	18	85	114
115	Road passenger baggagemen	36							2	15		3	62					12		15						115
116	Road passenger brakemen and flagmen	83	3			28			9	20		13	61	1		1		119		14	22					116
117	Road freight brakemen and flagmen (through freight)	2506	2654			407			173	672		782	684	47	176	1	1	1819	401	837	1529	234	576	27	175	117
118	Road freight brakemen and flagmen (local and way freight)	587	114			287			29	503		682	975	61	34	1	1	1118	76	991	1	1	335	39	204	118
119	Yard conductors and yard foramen	702	1006	1		367	1823	84	242	439	150	731	672	26	73	764	784	782	106	861	599	56	580	78	109	119
120	Yard brakemen and yard helpers	1315	2445	41		645			545	1488		1360	1345	47	265	1	1	2091	250	964	1	1	980	156	320	120
121	Road passenger engineers and motormen	78	13			29	929	4	5	104		13	95	1		19	7			15	18		68			121
122	Road freight engineers and motormen (through freight)	1247	7	33	53	226	2115	165	78	400	79	505	356	28	97	602	535	1099	169	507	844	23	281	16	87	122
123	Road freight engineers and motormen (local and way freight)	286	1	11	25	131	952	5	14	243	67	382	488	29	18	403	351	487	32	511	309	18	100	1	66	123
124	Yard engineers and motormen	673	1812	41	31	304	3284	66	195	513	139	671	664	23	86	668	714	776	83	708	500	67	576	71	118	124
125	Road passenger firemen and helpers	28	104			27			2																	125
126	Road freight firemen and helpers (through freight)	41	304	4	10	81			31																	126
127	Road freight firemen and helpers (local and way freight)	58	94	1	3	54			5																	127
128	Yard firemen and helpers	249	77	1	1	61			37																	128

All figures in blocks equal total railroad employees in classification

Legend Training Program Some Classroom & OJT OJT None Reported

usually extensive. The Chief Mechanical Officer, training supervisors, or instructors were most often cited as responsible for training. The qualification most often given as a prerequisite for assignment to training duty was job knowledge/experience and a teaching background. Twelve railroads said that the person responsible for training had no other assignment.

As a rule, railroads reported orientation, apprentice training, qualifying training, and skill improvement training for all divisions in Class IV for which training was provided. Orientation was generally 4 to 8 hours, though some railroads provided as many as 40 to 80 hours and one railroad reported 425 hours. Apprenticeship training hours also varied considerably. The most often reported was 3 to 4 years. Qualifying training ranged from 40 to more than 5,000 hours. Skill improvement training ranged from 40 hours to "varying and continuous." Classroom training for these crafts was reported by 18 railroads; instructional time was variable, ranging from 8 to 1,600 hours. On-the-job training for these trades was extensive, and ranged from a low of 34 to as many as 8,320 hours. In some cases railroads indicated that on-the-job training was continuous throughout an employee's entire career.

Facilities most often cited in training these employees were shops, yards and classrooms. Visual aids, mockups, and simulators were also used. Employees were trained for new tasks by supervisory personnel, through printed materials, and in seminars. Retraining was accomplished annually.

Certificates of proficiency were reported for some crafts. However, a certificate was required for assignment in only half the programs awarding it. Only three railroads reported they did not keep training records and only one said that it did no evaluations. Supervisors or instructors evaluated training programs through employee performance, test scores, efficiency and safety checks, or in a few cases, effectiveness studies conducted by the training department.

Training in Class V—Transportation (Other than train, . . ., engine, and yard.)-- The primary divisions receiving training in Class V are chief train dispatchers, train dispatchers, telegraphers, wire chiefs, telephoners, and tower men. The ICC reports that about 30,000 persons are employed in this class.

The supervisor of safety and rules and the train dispatcher were most often reported as responsible for training this class of employees. Past experience as a train dispatcher was most often given as a necessary qualification for instructing this class. Seven railroads reported that their instructors were full time; 12 railroads reported instructors were assigned other duties that were primary. Instructors were selected on the basis of craft knowledge and training experience. They maintained their craft expertise by reading published bulletins and FRA directives, and through staff meetings and conferences.

In general, the railroads that provided training in this class reported orientation, apprentice, qualifying and skill-improvement training. Orientation training was usually 4 to 8 hours though two railroads provided 200 hours. Apprentice training varied from 24 hours to 7,400 hours; the median apprenticeship was about 400 hours. Qualifying training was about 120 days and skill improvement

was reported to he continuous. Almost all railroads that provided training had formal classroom instruction ranging from 8 hours to as long as 1,040 hours; the most frequent time was 200 to 400 hours. On-the-job training ranged from a low of 6 hours to a high of 7,400 hours. One year was a common training period. Dedicated classrooms, simulators, audio visual aids, instruction cars, and operational equipment were used to support training in this class.

Employees in this class were considered qualified for duty on the advice of their supervisor, through written and oral testing, and on the completion of a training course. The employees' proficiency was maintained through operation and rules review classes, supervisory proficiency checks, and supplementary classroom training. Retraining is usually on an annual basis. Certificates of proficiency were issued by about half the railroads. They were generally not required for assignment to duty. Sixteen railroads maintained training records; 14 said they evaluated their training programs. Program effectiveness was based on the supervisor's evaluation, proficiency checks, testing and rules review.

Training in Class VI(a) Transportation (Yardmasters, switch tenders, and hostlers.)— Class VI(a) was the smallest class surveyed. It included 9,100 employees, 5,400 of which were yardmasters. Only a few railroads reported structured training programs for yardmasters, and these programs varied widely. The preponderance of training for this craft was on the job with some classroom time occasionally available.

Instructors for yardmasters were chosen because of their craft knowledge, experience, and ability to communicate; they usually had additional responsibilities. Only 11 railroads reported training for yardmasters, and only 2 of these can be considered comprehensive.

Employees in this class were considered qualified through testing, after completing the training program, by demonstrating ability, and through supervisory approval. Qualification was revalidated through supervisory observation and rules review. Certificates of proficiency were issued by seven of the reporting railroads and were required for assignment to duty.

Training in Class VIb Transportation (Train and engine.)-- ICC classification VI(b) includes conductors, brakemen, flagmen, yard conductors, yard brakemen, engineers and motormen, and firemen. These employees are primarily responsible for the operation and movement of trains on the road and in the yard, and their work is closely related to the safe movement of trains. The ICC reports that there are about 159,000 employees in this class.

The road foremen, rules manager or examiner, trainmaster, and assistant trainmaster are generally responsible for training train and engine service employees. They are chosen because of their knowledge of train operations, and supervisory and training experience. Twenty-five railroads reported they had full-time instructors in this class although not in every division. Railroads reported that some instructors had other duties. Instructors were kept current by attending classes and staff meetings and by reading literature and bulletins.

All but one railroad reported some training for this class of employees. Before this category of employees was qualified for independent duty, training included formal orientation, classroom instruction, on-the-job qualification training, and supervised on-the-job-training.

To accomplish this training, the railroads employed classrooms, track and yards, instruction cars, simulators, locomotives and cars, shops, mockups, mobile classrooms, books, etc. Most of the facilities were dedicated to training use. Three railroads reported that they train their employees in training centers.

Orientation for beginning students was generally 8 to 40 hours. In a few cases it was 168 hours. Apprenticeship training for the relevant divisions ranges from none reported to 3 years. Qualification training was 40 hours to 2 years. On-the-job training varied from a minimum of 40 hours to continuous. Skill improvement training involved book of rules classes, special instructions from bulletins, and periodic training as needed. Qualification for duty was established through written examination, supervisory endorsement, and completion of required training. Most railroads reported that their employees were regularly tested on operating rules; some mentioned surprise tests and supervisory observation as the way they checked proficiency.

All railroads maintained records on engineers and apprentice engineer employees. Most kept records on conductors and used these records to evaluate their programs; test scores were most often given as the measure used. Injury statistics, proficiency tests, and supervisor's judgment were also employed.

Summary.-- Based on the information provided by the railroads, the railroads do, in fact, train many of their employees, especially those in the critical skills. However, large numbers of railroad employees receive little planned training. The training can require the expenditure of considerable sums of money. The exact amount spent is uncertain, because most railroads did not have a separate budget for training nor did they keep records of training costs. Based on the data provided by eight reporting railroads, the Safety Board estimated that the Class I railroads spent about $40 million annually on training. There is every reason to believe this is a conservative figure. The industry employed the full range of known training practices and facilities. There were differences among the railroads in how training was accomplished, and these differences were probably related to the size of the railroad, its geographic dispersion, and whether the railroad had professional training specialists on its staff.

As an industry, the railroads did not establish the content of training programs by a determination of the critical and dangerous tasks involved in the operation of a railroad. They expressed the view, however, that these tasks were well known to the industry and that employees were informed of the necessary countermeasures during on-the-job training, apprenticeships, and rules instruction. The railroads referenced rulebooks, time tables, special instructions, and bulletins to support their position. Based on this information, it is evident that the railroads depended on past experience as the primary source of information on which to base their training programs. However, the concept of training analysis, commonly accepted in the training field, requires a detailed examination of a training system to provide the basic data essential to the development of the curriculum. The advantages of curriculum developed through a systems approach over a curriculum developed through operational experience follow:

- o There is greater assurance that all the critical knowledge and skills have been identified.
- o The analysis should disclose the consequences of failure of man or machine.
- o The analysis demonstrates the need for emergency procedures.
- o The analysis exposes the conditions essential to safe operation of the system.
- o The analysis, therefore, defines the proficiency level of the operator and thus, the basic criteria for testing.
- o The analysis provides the basis for achieving uniform performance even though training is offered at different locations and taught by different instructors.
- o A training analysis often exposes tasks or operations that are too difficult for average operators, and therefore require modifications of the operational equipment or system.

Undoubtedly, the vast experience of the railroads has convinced them that they have full insight and understanding of the critical variables that contribute to human error and, therefore, the training they are providing meets the perceived objective. The past accident record and the continuing occurrence of accidents involving human error suggest that not all of the critical factors are known, that some important elements in the qualification of trainees have been overlooked, and that some railroad employees who do not receive training need to be trained.

Union

The Safety Board sent questionnaires to nine railway labor organizations, including the AFL-CIO Railway Employee Department, which represents four rail unions. The Board asked 15 questions about the unions' role in training. (See Appendix B.) Each union reported that it was firmly committed to training and referenced that commitment in its policy statements. They recognized the importance of training as a means of assuring the safe movement of trains and encouraged occupational training by reporting their members' training needs to Governmental agencies and legislative bodies. They did not ordinarily provide the training, although they did keep members informed of changes in regulations and changes in skill requirements through their publications and organizational meetings. The unions expect the railroad to train their members in occupational skills, and they seek to guarantee this by contractual agreement.

For the most part, unions did not report the percentage of craft employees influenced by training agreements. The Brotherhood of Railroad Signalmen did report agreements on 28 railroads and estimated these agreements to cover 90 percent of the apprentice signalmen employed on Class I railroads. The unions were critical in their evaluation of training, pointing out that generally only newly hired employees were trained and that there was little or no refresher training. One union furnished the Board an extensive response to its inquiry on how its members were trained. The following statements are excerpted from that report:

> "Forty-three of the 55 General Chairmen indicated that some sort of training program existed in their jurisdictions. These data account for some 20,238 engineers. Twelve General Chairmen, representing 2,994 locomotive engineers, indicated that there were no training programs in their jurisdiction.

"...there is some relationship between having training programs and whether or not additional training is given when equipment and/or rule changes are made.

"The resources demanded by basic locomotive engineer training can, and are, also used to update training relating to equipment and rule changes. The data also demonstrate that training is typically not updated upon equipment changes and that training follows or precedes changes in rules and regulations only half of the time.

"Even in regard to company operating rules and safety rules, over 25 percent of the jurisdiction did not have any periodic retraining. The lack of refresher training in areas involving equipment and signal systems cannot help but raise operating costs and create safety problems... The situation is made more serious by the uniformly long intervals between periodic reviews, in those few cases where it is offered.

"...without the work experience of firemen as an element in the training system, there appears to be little more than 5 weeks of classroom instruction and some on-the-job experience which can be identified as training."

The unions reported that certification of their craft and testing for proficiency, if any, were performed by the carrier. Key occupational skills, such as signalman, were not certified on some railroads. The shop craft unions reported that they certify men as journeymen when they have completed the schedule of work, the correspondence instruction, and a minimum number of hours. No union reported training standards for newly hired employees.

With respect to public funding, only one union reported that it had requested funds to support training research. As far as could be determined, no funds had been made available for this purpose.

Governmental

The Safety Board also sent questions to the ICC, the FRA, and the U.S. Department of Labor to acquire information on their training activities and responsibilities. The ICC reported that it did not require an accounting code for training of railroad employees and, therefore, did not collect information that would allow it to define the resources applied to training by this industry.

The FRA reported that "the Secretary of Transportation is empowered by the Federal Railroad Safety Act of 1970 to prescribe rules, regulations, orders, and standards and to conduct research, development, testing, evaluation, and training for all areas of railroad safety. The FRA was delegated the responsibility and authority for the development and promulgation of essential regulations and standards to promote safety in all areas of railroad operations. Under this authority, the FRA issued under Title 49 -- Transportation, Chapter II --Federal Railroad Administration, Part 217, Railroad Operating Rules and Practices. The regulations were issued to learn the condition of operating rules and practices with respect to trains and other rolling equipment in the railroad industry, and each railroad is required to instruct its employees in operating practices."

In the FRA, responsibility for training is shared by the Office of Policy and Program Development, the Office of Chief Counsel, the Office of Research and Development, the Office of Safety, and the Northeast Corridor Improvement Project. The Office of Policy and Program Development is attempting to organize and define the FRA's role in the training of railroad employees. It is also attempting to unify training efforts within the FRA. Independent consultants are attempting to determine training research needs.

The FRA and the U.S. Department of Health, Education, and Welfare have agreed to work with railroad management and labor to develop vocational education programs to aid the railroad industry in meeting its need for skilled workers. Fifty percent of industry employees will reach retirement age before 1985. FRA Administrator John M. Sullivan commented, "New training and recruitment programs are absolutely essential if the railroad industry is to continue to compete as a viable transportation mode ...." Under the agreement, a joint task force will be established to identify manpower needs, improve existing vocational education programs, and conduct demonstration programs for both newly hired and current employees.

The FRA Associate Administrator for Research and Development has sponsored projects to identify job functions of particular railroad employee groups. The FRA Associate Administrator for Safety provides technical training to the railroad industry in Federal safety regulations and standards to insure that the laws are applied uniformly. The FRA is responsible for allocating funds for the Northeast Corridor Improvement Project and has provided training support to employees working on this project. In summary the FRA's current policy is to support railroad corporations by assisting them in fulfilling their training responsibilities.

The FRA has never had the ability to assess responses it receives under Title 49, Chapter II, Part 217. Currently no organization exists within the FRA to assess the adequacy, the quality, or the quantity of training offered or received in the railroad industry. Currently, the FRA is not structured to determine what training should be offered to critical skill groups in railroad occupations.

The Secretary, U.S. Department of Labor, furnished the Safety Board information concerning activities in its Employment and Training Administration's Bureau of Apprenticeship Training and its Office of National Programs. The Employment and Training Administration administers programs under CETA, which provides funds to encourage training for selected groups throughout the United States. Some railroad programs are funded through this locally administered program.

The Employment and Training Administration's Office of National Programs reported that, through its HIRE program, it has entered into funding agreements with 12 railroads; $11.6 million was allocated for the training required in 6,362 jobs. They also funded three railroad demonstration programs directed at improving the employability of disadvantaged youths. The skills involved were relevant to rail transportation.

The Bureau of Apprenticeship Training (BAT) administers the requirement of the Apprenticeship and Training Act of 1937. Under this program the Department of Labor examines apprentice training provided in the railroad industry. If it meets the standards contained in the Apprenticeship and Training Act, it is certified by the Department. The Department of Labor reported to the Safety Board . . .

> "The program of apprenticeship with railroads which are approved and registered by BAT are the ones which the individual railroads have developed and have voluntarily submitted to BAT for approval."

Nineteen railroads have some certified training programs involving, at the time of the Department of Labor report, 6,196 trainees. The Department informed the Board that:

> "All apprenticeship programs for railroads currently registered with BAT are for the shop craft trades, namely, Boilermaker, Blacksmith, Carmen, Electrician, Machinist, and Sheet Metal Workers. However, the Brotherhood of Locomotive Engineers does have approved National Apprenticeship Standards for the training of locomotive engineers.
>
> "That document is a guideline which can be used to develop an apprenticeship program for railroad locomotive engineer training. The United Transportation Union also has a similar document which is older and now somewhat obsolete. . . ."

Existing training programs for locomotive engineers and firemen (helper) are not certified or registered with the Department of Labor's Bureau of Apprenticeship Training.

> "In addition to the apprenticeship training which BAT coordinates with the railroads, there have been numerous skill improvement programs established with various railroads for a variety of occupations. This training was designed to upgrade the skill levels of those already employed by the industry.
>
> "BAT provides no money to finance such programs, either apprenticeship or skill improvement. However, some funds are available from BAT for the promotion and development of such programs."

The Board notes that the Department of Labor is not currently structured to coordinate its efforts in the railroad industry, and many of its programs are not particularly suited to meet the needs of rail corporations. Nevertheless, the Department has had a constructive role in shaping the apprenticeship program in the railroad industry, which serves as a primary source of training for many skilled craft groups critical to railroad safety.

Under the HIRE program, funds flow into the railroad industry to assist in training; however, there is no requirement to insure that these funds and employees assisted by these funds will be trained under programs certified by the Bureau of Apprenticeship Training. Only three recipients of funds under the HIRE program have a certified apprenticeship training program. Current apprenticeship program agreements do not stipulate program content.

The Safety Board believes that all Federal and State programs must be reviewed and integrated into the overall training programs by the FRA, a need which the FRA has also recognized, to insure that the objective of providing relevant training for the skilled railroad crafts is met.

APPENDIXES

APPENDIX A
Inquiry Form

COMPANY REPORTING:

ADDRESS:

REPORTING OFFICER:
TITLE:

PHONE NUMBER (including Area Code):
DATE OF REPORT:

PART I
GENERAL RAILROAD INFORMATION

1. What is the corporate policy with respect to training? Please attach a copy.

2. Please describe the method by which this policy is being implemented.

3. Who in your system is responsible for training (title, address, telephone number)? What are his qualifications as a training manager?

4. To whom does the training manager report (by title)?

5. How many persons are on the training manager's staff?

6. What are the staff qualifications?

7. What was the training budget for 1977?

8. What is the projected budget for 1978?

9. Give the total number of employees working in maintenance, operations, and inspection.

10. Give the number of manhours employees (in ICC Classification III through VI(b)) spent in formal training last year, excluding on-the-job training.

11. Indicate the total number of employees who received formal training in 1977.

12. Give the number of man days of formal training planned for 1978.

APPENDIX A

13. Do you receive funding from Federal or State agencies for your training program? If so, identify program and amount of funding.

Response to this questionnaire is voluntary. Participation, while not required, will be sincerely appreciated.

PART II
SPECIFIC CRAFT INFORMATION

Please furnish the following information in consonance with Employee Classifications of the Interstate Commerce Commission Monthly Report of Employees, Service and Compensation Wage Statistics Forms A and B. Please complete a separate questionnaire for each classification of employees who receive training and are working in maintenance, inspection and operation of your railroad. Employees of several ICC Classifications in which training is the same can be grouped, for example, Engineers ICC Classification 121-122-123-124.

1. Give the title or position and qualifications of the person or persons responsible for training this classification of employees.

2. Are the training personnel involved only in training or do they have additional responsibilities?

3. How are the instructors selected?

4. How are the instructors qualified for instruction?

5. How are instructors kept up-to-date on system changes?

6. How many employees do you have in this class of service?

7. Describe the training program presently used on your railroad. Include course outlines in this class of service.

8. How long has this program been in effect?

9. What resources (manpower, dollar costs) are devoted each year for training this class of employees?

10. How many hours on training are spent by each employee during his career in:

    a. Orientation
    b. Apprenticeship Training
    c. Qualifying Training
    d. Skill Improvement Training

11. What facilities are used for training (e.g., classroom, tracks, shops, simulators, etc.)? Are these dedicated facilities?

12. How many hours of classroom training are given in the classifications under question 10 above?

13. How many hours of on-the-job training are given in the classification under question 10 above?

14. Has a task analysis for this class of employee been developed? Please attach documentation.

15. Have you identified and recorded the hazardous tasks of this occupation? Please include copies.

16. Are job-related actions of this class of employees that could result in derailments or collisions documented?

17. Are countermeasures for the hazards documented, developed and utilized in employee training programs as course material?

18. How do you train employees of this class to deal with emergencies?

19. Is this class of employees' responsibilities in emergencies documented? If so, furnish a copy of instruction.

20. How many employees in this class of service have received training under the present program?

21. How is an employee in this class of service recognized as qualified? What method is used to revalidate his proficiency?

22. What retraining procedures are used to insure that continuing proficiency is maintained? How are employees trained for new tasks? What is the frequency of retraining?

23. Have you developed a measure for evaluating the effectiveness of the present training program? Describe.

24. Are training records maintained for each employee?

25. Are certificates of proficiency issued? Is this a requirement for assignment to duty?

NOTE: These questions assume that the corporation provides a uniform training program for employees of this class throughout the system. If training practices for this class of employees differ, training differences should be noted. In some instances it may be necessary to complete separate questionnaires to account for these differences.

APPENDIX B

INQUIRY FORM TO RAILROAD UNIONS

1. What is the policy of your organization with regard to occupational training? In implementing this policy, what are your goals and objectives for achieving training?

2. What classes of employees do you represent under current A-300 ICC Classifications?

3. What is the current union role concerning training of employees represented by your organization? NOTE: If more than one craft is represented please comment on each craft.

4. How are persons in your occupation trained?

5. Does your union assist in occupational training? Describe.

6. Do you provide resources or personnel for training?

7. If training personnel were provided, how were they selected and qualified as instructors?

8. Are all persons in this craft given training? If not, what are the criteria for selecting those who do receive training?

9. How are employees represented by you trained for the system changes?

10. How are members of your organization tested for proficiency and certified? By whom is this done?

11. Have you set training standards for newly hired employees?

12. Please furnish a copy of a representative sample of a collective bargaining agreement on training. What percentage of the craft is covered by training agreements?

13. What type of training aids or training materials is furnished by your organization to your union members? (Please furnish copies when practicable.)

14. What information or training do you provide on FRA regulations?

15. Have you sought public funding for your crafts training?

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